



**US Army Corps  
of Engineers**

# **DCAF Bulletin**

**Design Construction Analysis Feedback**

No. 98-8    Issuing Office: CEMP-EC    Issue Date: 8/6/98    Exp. Date: 31 DEC 00

## **CEMP-EC**

**Subject:       Repetitive Mechanical Observations**

**Applicability:    Information**

1. This bulletin provides feedback on repetitive mechanical observations that have been noted by Design Construction Evaluation (DCE) team members over the last several years. The design and construction requirements are noted with each observation.

**OBSERVATION:** The mechanical fastener spacing for exposed insulated rectangular duct is not correct.

**REQUIREMENT:** Guide Specification 15250, paragraph 3.3.3.2 (a) requires the rigid insulation shall be secured to the duct by the use of mechanical fasteners on all four sides of the duct, spaced not more than 12 inches apart and not more than 3 inches from the edges of the insulation joints. A minimum of two rows of fasteners shall be provided for each side of duct 12 inches and larger and a minimum of one row for each side of duct less than 12 inches. See figure 1.

**OBSERVATION:** Plumbing waste vents are terminated too close to building openings.

**REQUIREMENT:** National Standard Plumbing Code 1996 edition paragraph 12.4.4 states "No vent terminal shall be located directly beneath any door, window or other ventilating opening of the building." See figure 2 for proper spacing of vent.

**OBSERVATION:** Fire Stopping installations are not being certified.

**REQUIREMENT:** Guide specification 07840 paragraph 1.1 requires the manufacturer's representative to provide certification that Fire Stopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements.

**OBSERVATION:** Insulation on cold air ducts is not being carried over fire dampers and retaining angles where condensation is a problem.

**REQUIREMENT:** Guide Specification 15250 states "Duct insulation terminating at fire dampers, shall be continuous over the damper collar and retaining angle of fire dampers, which are exposed to unconditioned air and which may be prone to condensate formation." See figure 3.

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OBSERVATION: Natural gas service regulators are being installed in front of air inlets to buildings. If the regulator diaphragm fails gas could be pulled into building.

REQUIREMENT: Guide specification 02685 requires all service regulator vents and relief vents to terminate in the outside air in rain and insect resistant fittings. The open end of the vent shall be located where gas can escape freely into the atmosphere, away from any openings into the building and above areas subject to flooding. See figure 4.

OBSERVATION: A vacuum relief valve is not being installed in the cold water supply line to hot water storage tanks or water heaters.

REQUIREMENT: Guide specification 15400 requires a vacuum relief valve to be provided on the cold water supply line to the tank and mounted above and within 6 inches above the tank. See figure 5.

OBSERVATION: Some contractors are not installing a service stop and drain valve in the building water service just inside the building.

REQUIREMENT: Guide specification 15400 paragraph 3.1 requires a gate valve or full port ball valve and drain to be installed on the water service line inside the building approximately 6 inches above the floor from point of entry. See figure 6.

OBSERVATION: Flush valves are being installed at the wrong height and without proper support.

REQUIREMENT: Guide specification 15400 requires flushometer valves to be secured to prevent movement by anchoring the long finished top spud connecting tube to wall adjacent to valve with approved metal bracket. Flushometer valves for water closets shall be installed 39 inches above the floor. See figure 7.

OBSERVATION: During construction backflow preventers are being installed with a valved bypass around it. Also, some designers are showing the valved bypass on the backflow preventer detail. The bypass has a valve installed for isolating the backflow preventer for maintenance. If the valve is opened contamination of the potable water system is possible.

REQUIREMENT: The National Standard Plumbing Code 1996 edition paragraph 10.4.3 requires each potential cross connection within the premises shall be protected. The valved bypass around the backflow preventer is a potential cross connection. If a bypass is required then require a backflow preventer in the bypass. Contractors shall not install a valved bypass and designers shall not show a valved bypass on the backflow preventer detail. See figure 8 for proper installation of backflow preventer.

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OBSERVATION: Piping from the outlet of relief valves for water heaters have multiple elbows in the discharge piping with several changes in direction as the piping is being routed to the floor drain. Where two or more relief valves serving independent systems are located in the same area the discharge piping is being combined into a common line routed to drain.

REQUIREMENT: The National Standard Plumbing Code edition 1996 paragraph 10.16.6 (c) requires the discharge pipe to be no smaller than the outlet size of its relief valve and shall extend to a point of disposal without valves, traps or rises that would prevent the relief valve from draining by gravity. Discharge end of the pipe shall not be threaded. Section 4, Part HLW-800 of the ASME Boiler and Pressure Vessel Code covers the safety valve requirements for water heaters and Article 8 paragraph HLW-801.7(a) states "When an elbow is placed on a safety relief discharge pipe, it shall be located close to the valve outlet." This indicates only one elbow is allowed in the discharge piping and it shall be located close to the relief valve outlet. The National Standard Plumbing Code edition 1996 paragraph 10.16.6 (g) states "If the point of disposal is outside the room or space in which the relief valve is located, an indirect gravity drain shall be provided from the room or space to the point of disposal." See figures 9 and 10.

OBSERVATION: Implementation problems with the requirements for seismic protection of mechanical and electrical equipment, building piping, conduit and exterior utilities continues to be noted during DCE site visits.

REQUIREMENT: Reference DCAF Bulletin No. 97-01 for a summary of the requirements for Guide Specification 13080 Seismic Protection For Mechanical, Electrical Equipment.

OBSERVATION: Duct smoke detectors continue to be improperly located, installed and field tested.

REQUIREMENT: Reference Code Forum No. 95-04 for guidance on proper location, installation and testing of duct smoke detectors.

OBSERVATION: Frequent comments are noted on the installation of thermal insulation for mechanical systems during DCE's. The ultimate purpose for insulation is for energy conservation and condensation prevention. There are too many deficiencies noted during site inspections reducing the effectiveness of thermal insulation for mechanical systems.

REQUIREMENT: Reference DCAF Bulletin No. 95-06 which summarizes Guide Specification 15250 requirements for installation of piping, duct work and equipment insulation.

OBSERVATION: Frequently pipes and or tie rods penetrating concrete slabs on grade are cast directly into the slab. If a sleeve is provided many installations have the tie rods outside the sleeve and cast directly into the slab.

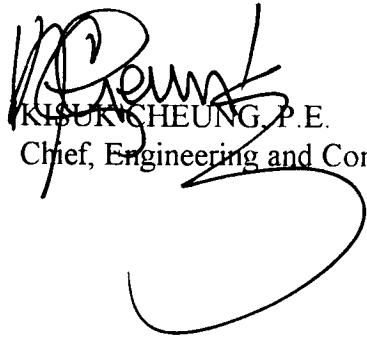
REQUIREMENT: Guide Specification 15400 paragraph 3.1.6.1 requires a sleeve for all pipes passing through all concrete floors or walls except sleeves are not required for cast-iron soil pipe passing through concrete slab on grade, except where penetrating a membrane waterproof floor. All other pipe penetrations and tie rods shall be inside the sleeve at each concrete slab penetration. See figure 11.

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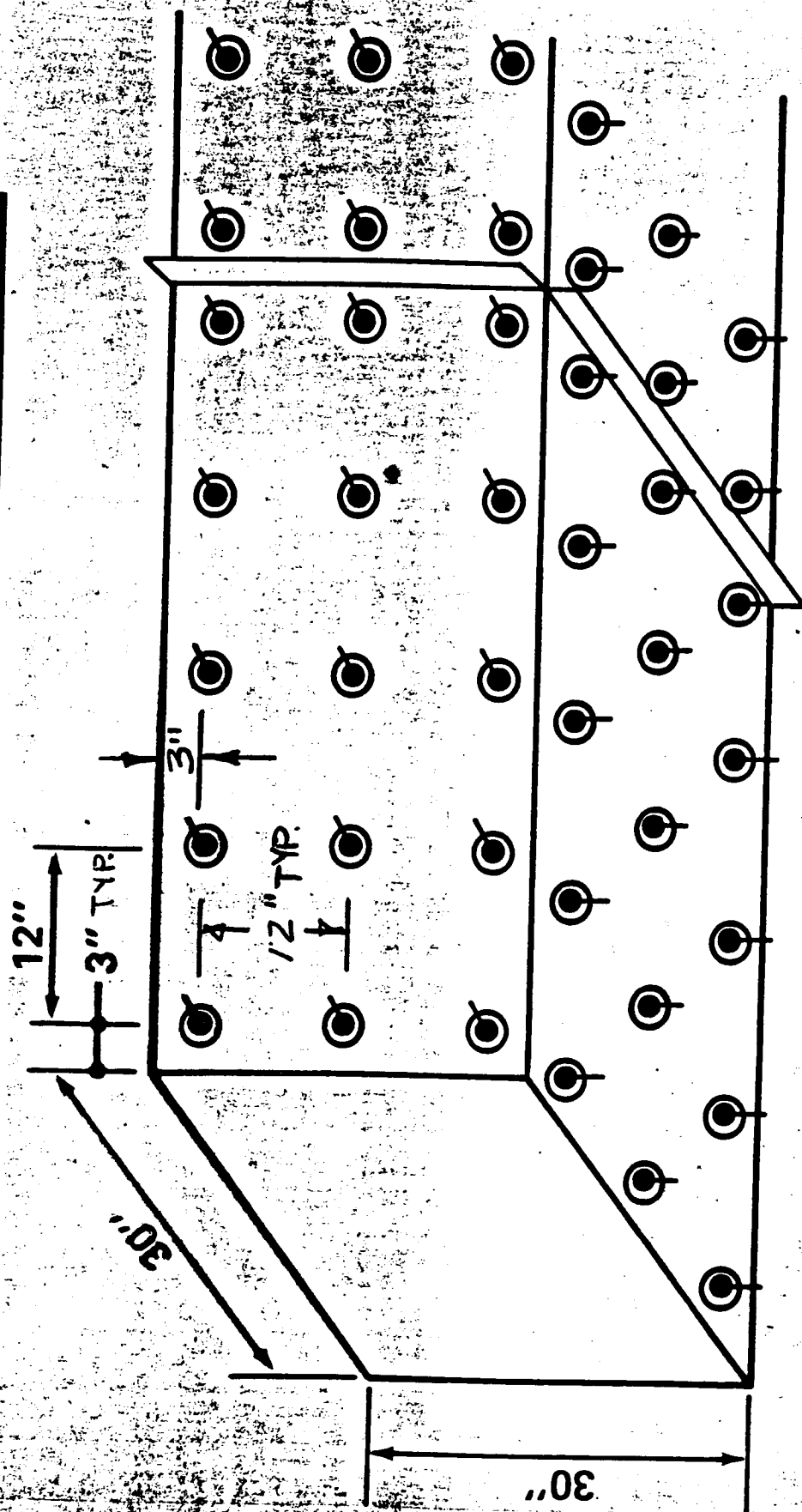
2. Field personnel should insure that these items are covered at the preparator and initial phases. Reviewers should be alert for deviations from the Guide Specifications during BCOE reviews. My point of contact is Gary Bauer phone (202) 761-0205.

Encls



KISUK CHEUNG, P.E.  
Chief, Engineering and Construction Division

# EXPOSED DUCTWORK WITH RIGID INSULATION



- ADHESIVE
- MECHANICAL FASTENERS
- ON ALL FOUR SIDES OF DUCT

FIGURE 1

#### 12.4.4 Location of Vent Terminal

No vent terminal shall be located directly beneath any door, window, or other ventilating opening of the building or of an adjacent building, nor shall any such vent terminal be within 10 feet horizontally of such an opening unless it is at least 2 feet above the top of such opening.

See Figure :

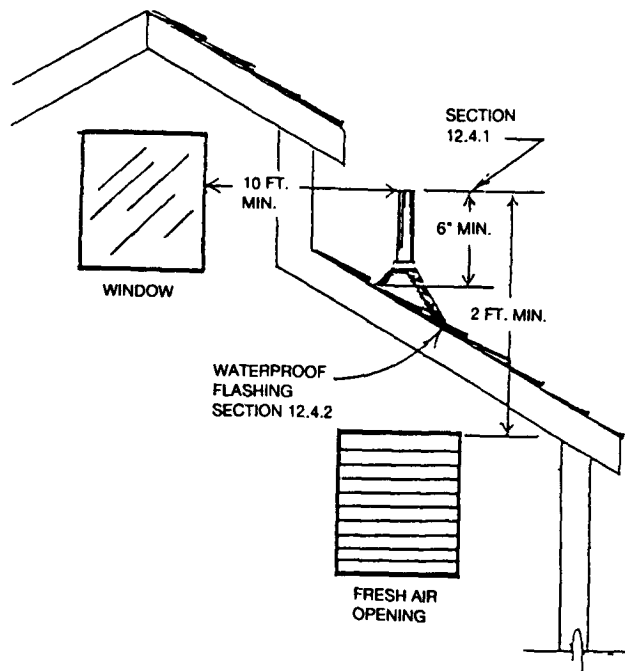


FIGURE 2 : EXAMPLE OF A TYPICAL VENT TERMINAL

NOTE: THE SEPARATION OF THE VENT TERMINAL FROM DOOR, WINDOW, AIR INTAKE, AND AIR EXHAUST OPENINGS PREVENTS FOUL ODORS FROM ENTERING THE BUILDING.

COLD AIR DUCTWORK



FIGURE 3



## VAPOR BARRIER

## GLASS CLOTH

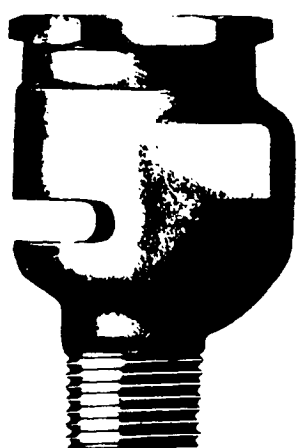
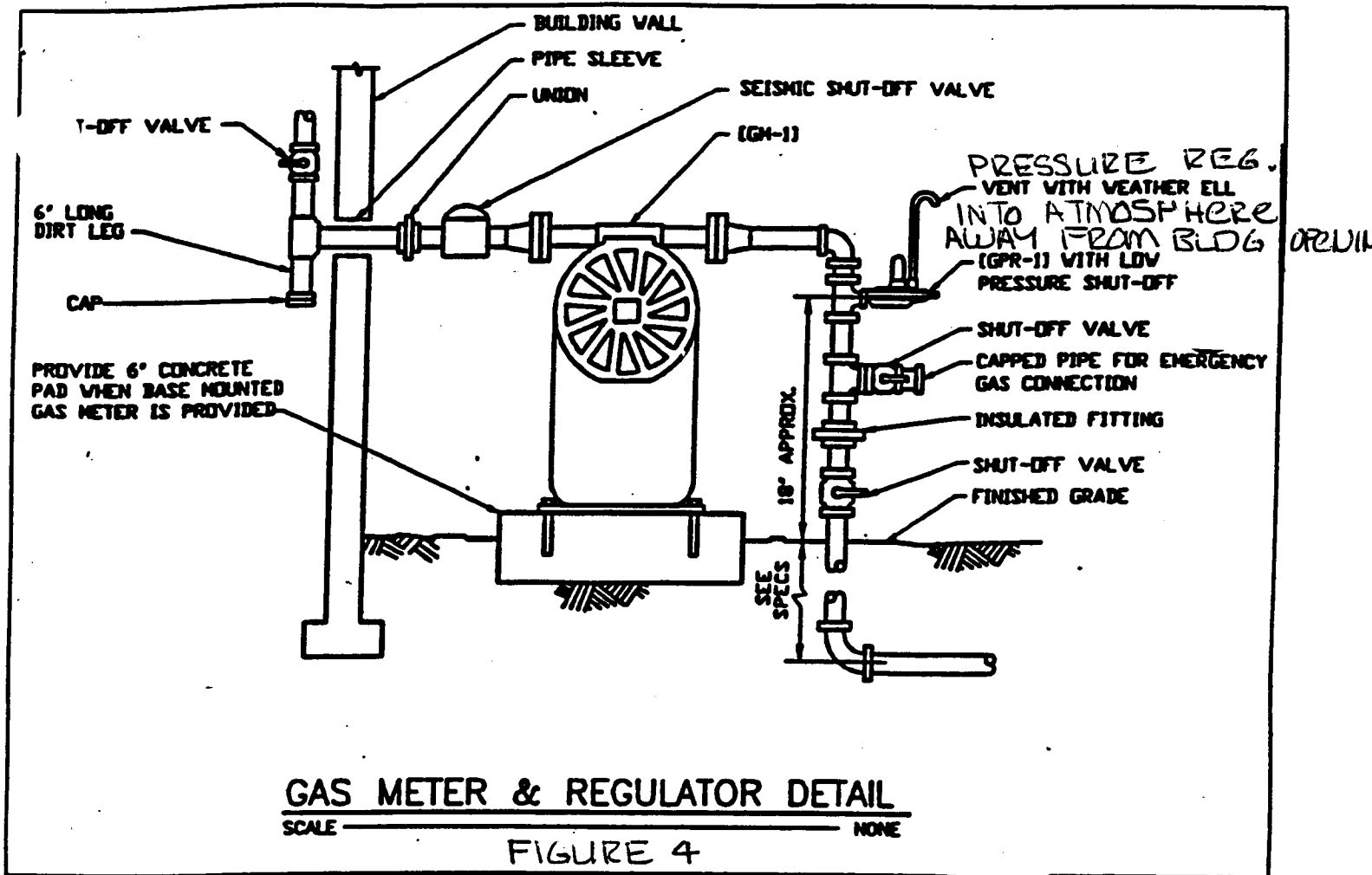
**1/16" MIN THICK**

## VAPOR BARRIER

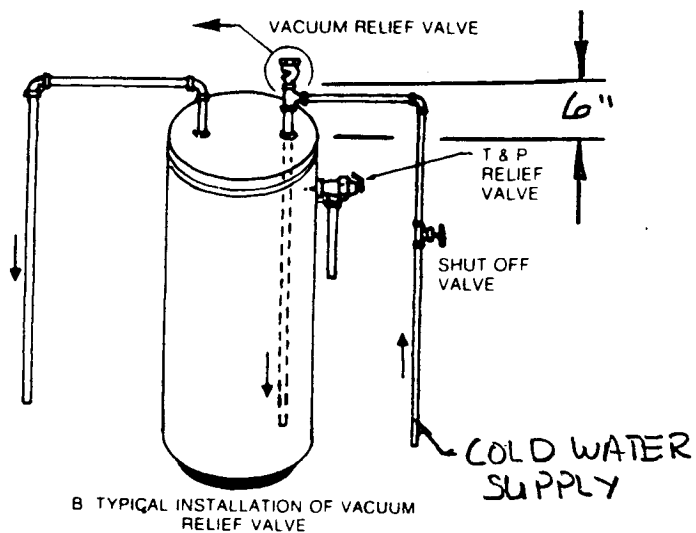
## COATING

ENLARGED DETAIL  
(TYPICAL ALL SIDES)

FIGURE 3

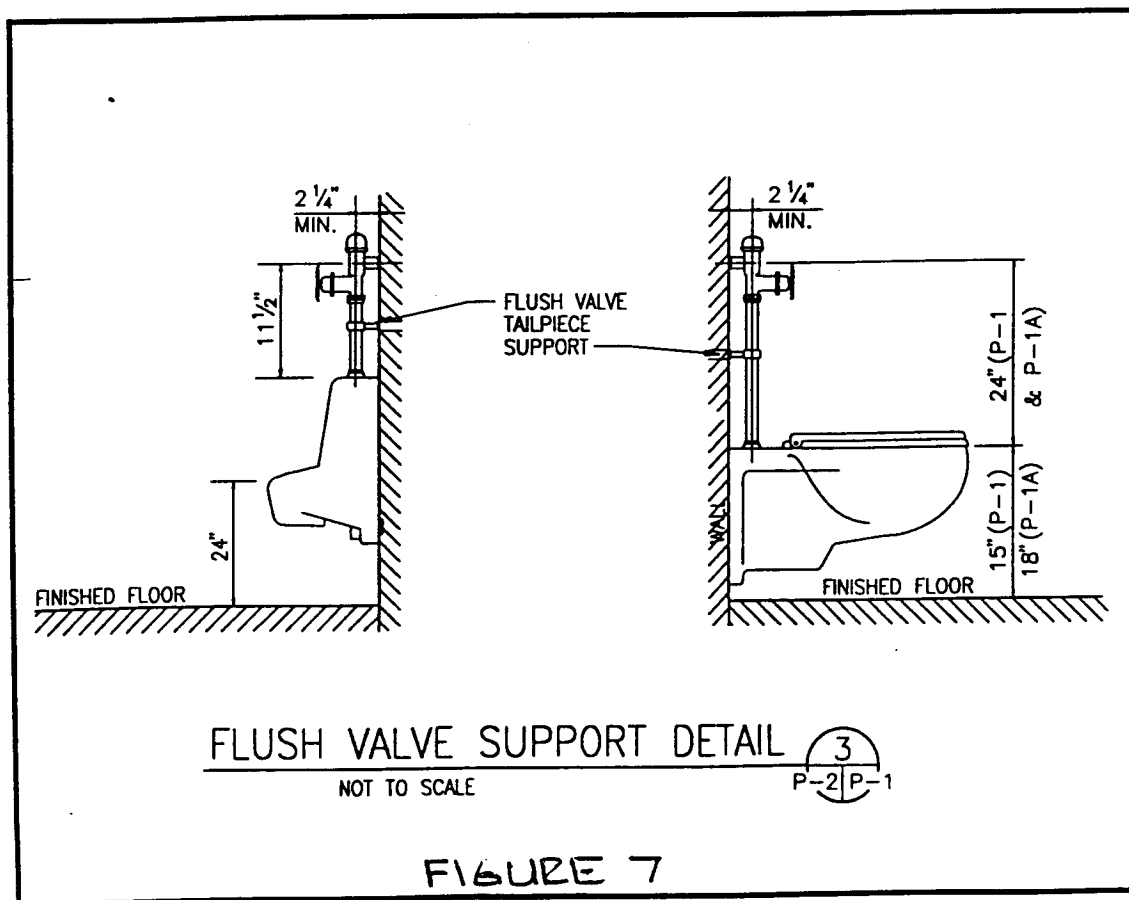
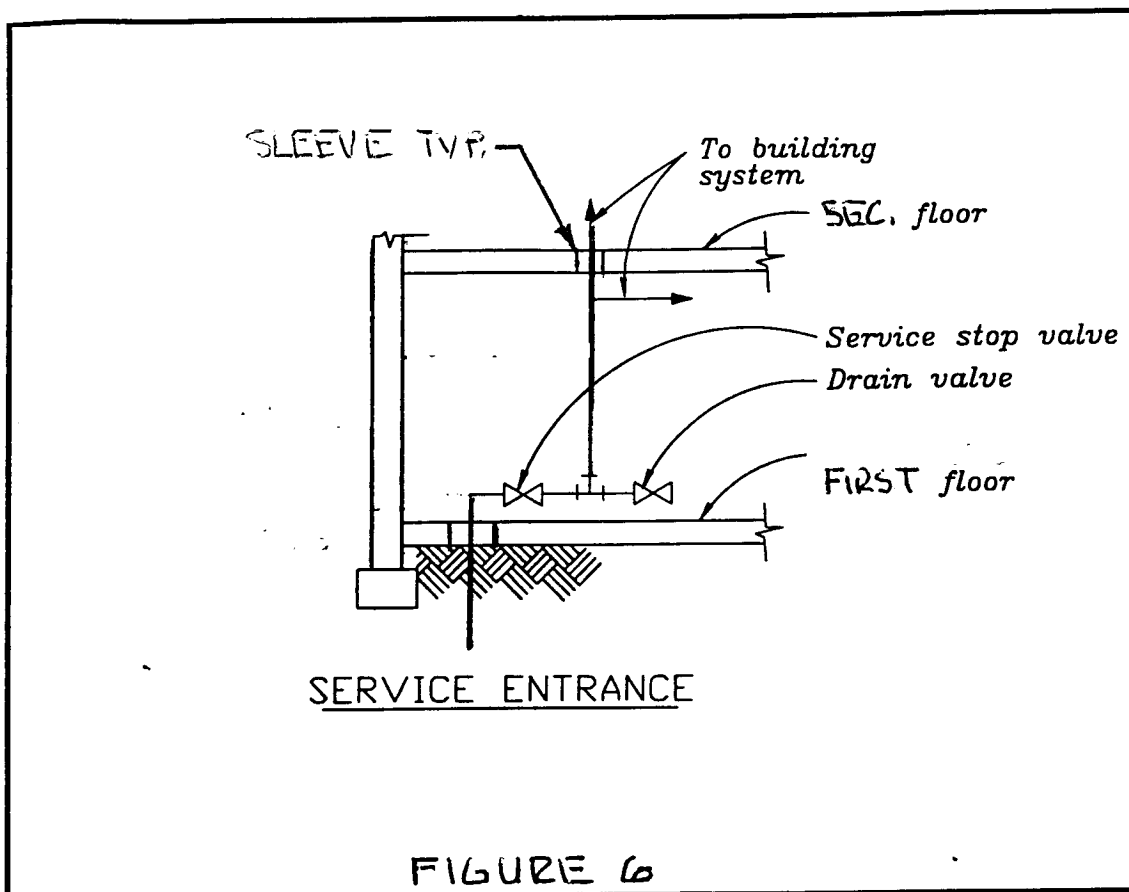


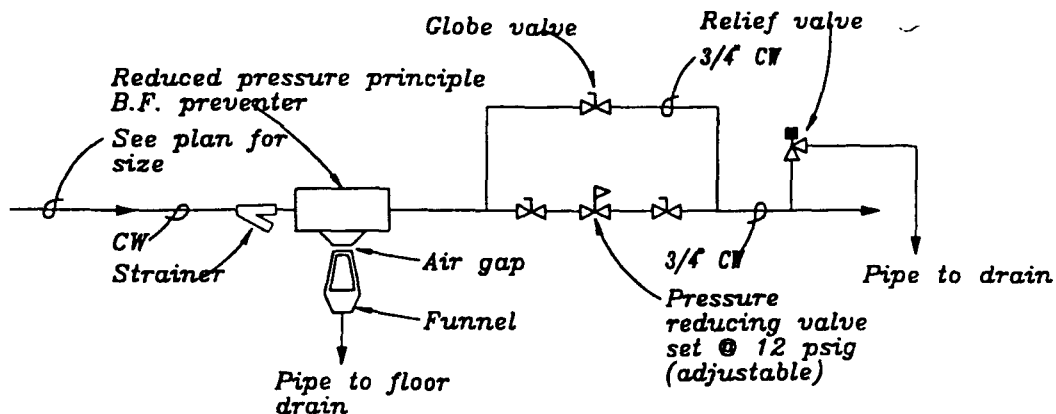
A VACUUM RELIEF VALVE



**FIGURE 5**



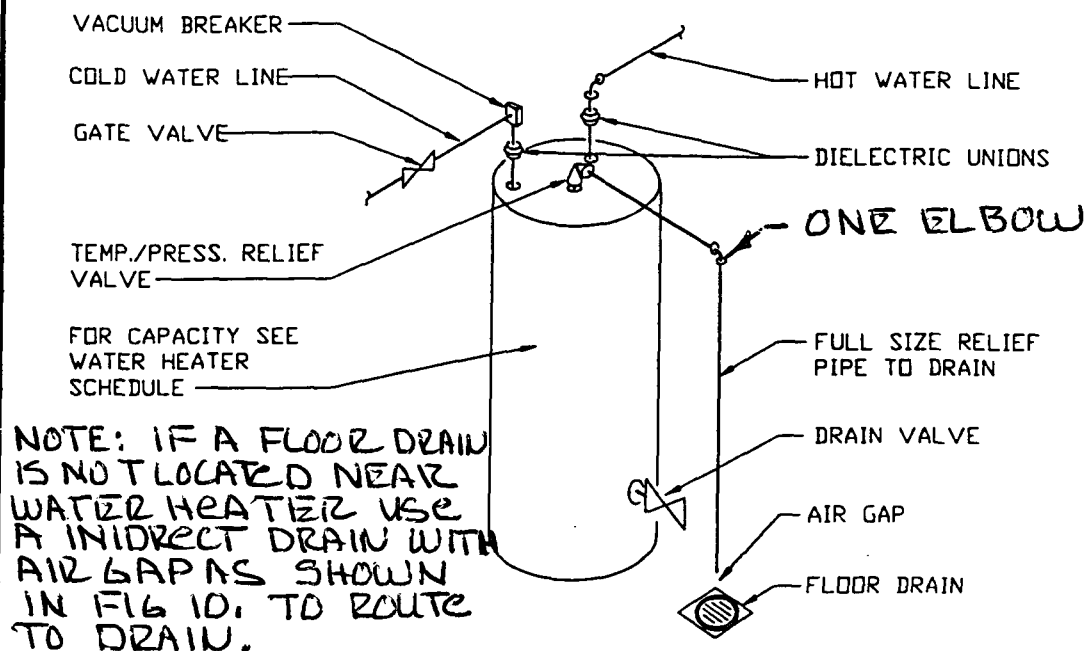




BACKFLOW PREVENTER DETAIL

NO SCALE

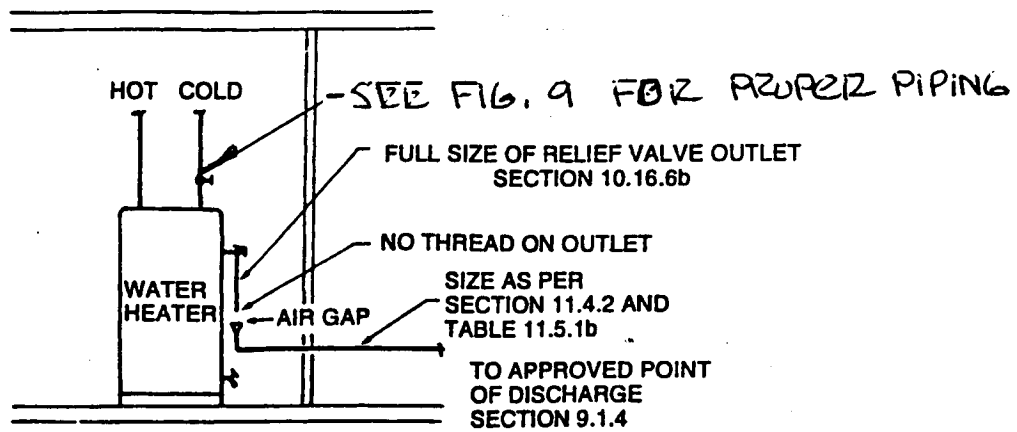
FIGURE 8



WATER HEATER DETAIL

N.T.S.

FIGURE 9



### INSTALLATION OF RELIEF VALVE AND DISCHARGE PIPING

NOTE: THE PIPING WHICH CONNECTS DIRECTLY INTO THE RELIEF VALVE SHALL BE SUITABLE TO WITHSTAND THE TEMPERATURES OF THE DISCHARGE WITHOUT DISTORTION. THIS PIPING SHALL TERMINATE WHERE, IN THE OPINION OF THE ADMINISTRATIVE AUTHORITY, THE DISCHARGE WILL NOT CREATE A NUISANCE, STRUCTURAL DAMAGE OR A SAFETY HAZARD.

FIGURE 10

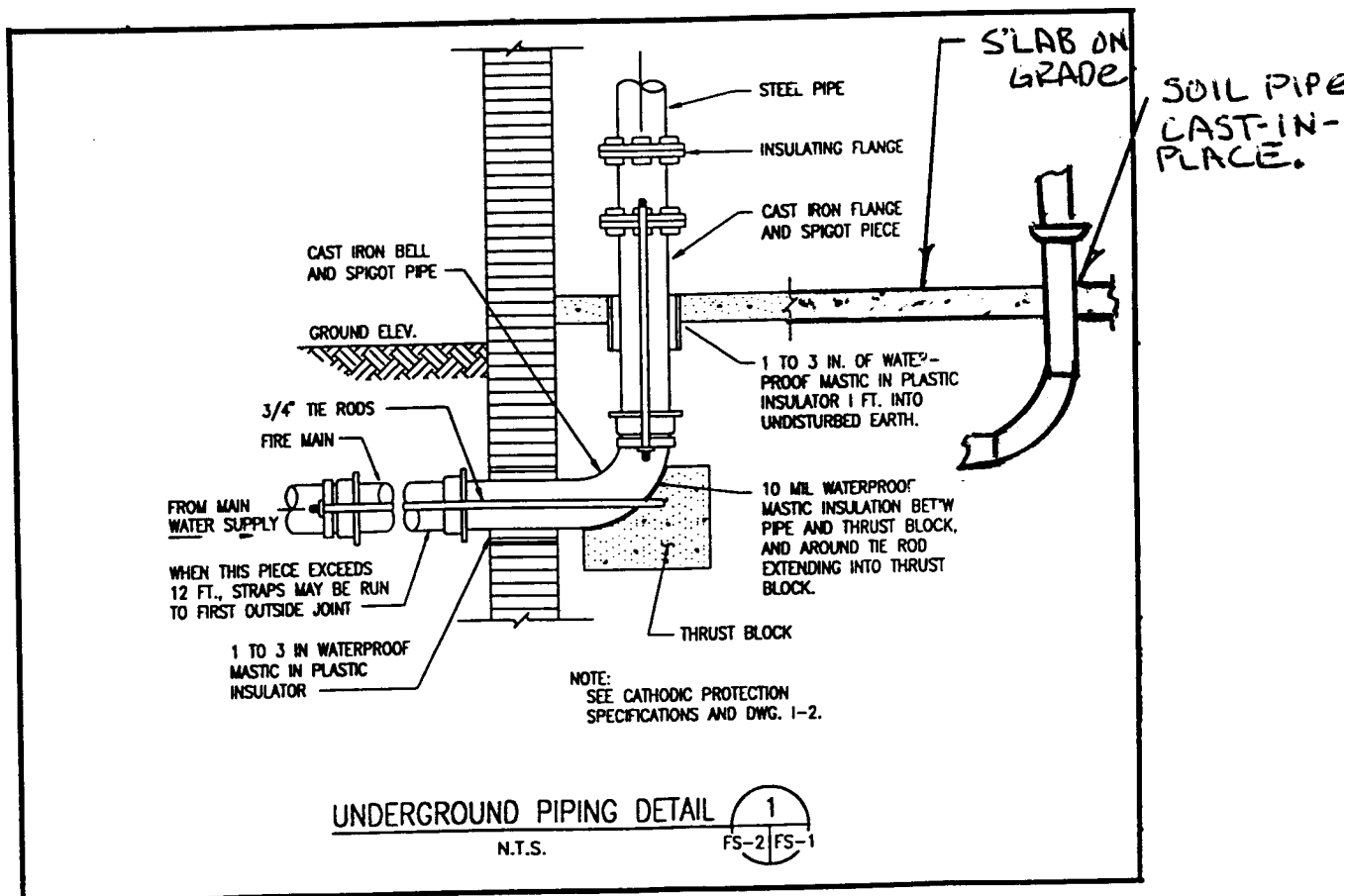


FIGURE 11